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New fairy-folk crickets from New Guinea (Grylloidea, Eneopterinae, Lebinthina)

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Abstract

Two new genera of Lebinthina (Grylloidea, Eneopterinae, Lebinthini) are described from New Guinea, each genus including a new species: *Diablotinthus lengguru* Robillard & Tan, **sp. nov.** and *Lutinthus timika* Robillard & Tan **gen. et sp. nov.** *Diablotinthus* also includes *D. ambonensis* (Robillard, 2010) **comb. nov.** A new species of *Gnominthus* Robillard & Vicente is also described from Hihilai Plantation in Milne Bay, Papua New Guinea: *G. hihilai* Robillard & Tan, **sp. nov.** The calling song of *D. lengguru* Robillard & Tan, **sp. nov.** is also described.

Keywords

Calling song, *Diablotinthus*, *Gnominthus*, Indonesia, *Lutinthus*, new genus, new species, Papua New Guinea

Introduction

Lebinthini is a highly speciose tribe of crickets from the subfamily Eneopterinae that exhibits a vast diversity in morphology and calling songs (e.g., Robillard and Desutter-Grandcolas 2004, 2011, Tan et al. 2021). The systematic study of subtribe Lebinthina in New Guinea has revealed high species and genera diversities in this mega-rich island; new genera include *Centuriarus* Robillard, 2011), *Gnominthus* Robillard & Vicente, 2015 (Vicente et al. 2015), *Microbinthus* Robillard & Dong, 2016 (Robillard et al. 2016), *Macrobinthus* Robillard & Dong, 2016 (Robillard et al. 2016), and *Rugabinthus* Robillard & Tan, 2022. New species include 12 from the recently erected genus *Rugabinthus* (Tan and Robillard 2022) and a second species of *Gnominthus* (*G. milneus* Tan & Robillard, 2021).

Further examination of more material—from both newly collected specimens and old museum collections—has led to the discovery of several unknown Lebinthina lineages that exhibit unique general and genitalia morphological characters (Fig. 1). Here, we describe two new genera from New Guinea: *Diablotinthus* Robillard & Tan, **gen. nov.** and *Lutinthus* Robillard & Tan, **gen. nov.** Each genus currently consists of only its previously undescribed type species, i.e., *Diablotinthus lengguru* Robillard & Tan, **sp. nov.** and *Lutinthus timika* **gen. et sp. nov.**, respectively. Additionally, *Lebinthus ambonensis* Robillard, 2010 is transferred to *Diablotinthus*: *D. ambonensis* (Robillard, 2010) **comb. nov.** Based on specimens from old collections, we describe here the third known species of *Gnominthus*: *G. hihilai* Robillard & Tan, **sp. nov.**

Materials and methods

Materials.—New material was collected during the Lengguru 2014 expedition in West Papua, Indonesia and will be deposited in the collections of the Museum Zoologicum Bogoriense, National Research and Innovation Agency (BRIN), Bogor, Indonesia (MZB); Muséum national d'Histoire naturelle Paris, France (MNHN); Zoological Research Collection, Singapore (ZRC); and the Koleksi Serangga Papua, Jayapura (KSP). The crickets were collected mostly by sight and during both night and day. Additional specimens studied were on loan from the Academy of Natural Sciences of Philadelphia, Pennsylvania, United States of America (ANSP), MZB, and Naturalis Biodiversity Center (formerly Rijksmuseum van Natuurlijke Historie), Leiden, the Netherlands (RMNH).

Morphology.—Habitus images of pinned specimens were obtained using a Canon EOS 6D digital SLR camera with a compact-macro lens EF 100 mm f/2.8 Macro USM; close-up images of morphological features were obtained using a macro photo lens MP-E 65 mm f/2.8 USM (1–5×). Image stacking was performed using Helicon Remote version 9.3.1. W and Helicon Focus 6.8.0. Image editing used Adobe Photoshop CC 2014. Measurements of dried-pinned specimen were made from these images using ImageJ 1.51j8

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(Wayne Rasband, Research Services Branch, National Institute of Mental Health, Bethesda, MD, USA).

Examination and dissection of male genitalia followed Tan and Robillard (2022) and Robillard and Tan (2023). The genitalia were imaged using a binocular microscope Leica MZ16 with an AMScope Microscope Eyepiece Camera (MU1000, 10 MP Aptina Colour, CMO50) attached via an AmScope FMA050 fixed microscope adaptor and the software ToupView. Male genitalia and forewing (FW) venation follow terminology by Robillard and Desutter-Grandcolas (2004).

Abbreviations.—

General morphology

I, II, III	front, median, hind respectively (legs, femora, tibiae)
F	femora
FW	forewing
TaIII-1	basal segment of hind leg tarsomere
T	tibiae

Measurements

BL	body length (from apex of fastigium to apex of subgenital plate)
FIIIL	length of hind femora
FIIIW	width of hind femora (at the level of maximal width)
FWL	forewing length
FWW	forewing width (at the level of maximal width)
OL	ovipositor length
PronL	pronotum length
PronW	pronotum width (at the level of maximal width)
TIIIL	length of hind tibiae

Male genitalia

ec arc	ectophallic arc
ec ap	ectophallic apodeme
ec f	ectophallic fold
en ap	endophallic apodeme
en s	endophallic sclerite
ps l	pseudepiphallic lophi
ps p	pseudepiphallic paramere
r	rami

Acoustic and video recordings.—We recorded the cricket songs using a modified Condenser Microphone Capsule CM16 (Avisoft Bioacoustics, Berlin) connected to a Fostex FR-2LE digital field recorder (96 kilo-samples per second sampling frequency, 16 bit). This was done either in the field or in captivity. In captivity, the cricket to be recorded was kept in a small insect cage with a nylon cover, and the microphone was placed beside the cage no more than 30 cm away with the microphone pointing horizontally toward the cage.

The basic cricket song terminology generally follows Baker and Chesmore (2020):

Calling song: spontaneous song produced by an isolated male to attract a female
Dominant frequency: frequency with highest energy from the mean spectrum
Echeme: a first-order assemblage of syllables
Echeme sequence: a first-order assemblage of echemes
Interval: silent interval between calls and/or pulses, or down-time
Syllable: sound produced by a single stridulatory movement (i.e., closing of wings)

Acoustic analyses followed that of Tan et al. (2022, 2023). We measured the parameters of the temporal domain (e.g., durations and intervals) manually using Raven Lite 2.0.0. The peak frequency was obtained using the 'spectro_analysis' function from the R package warbleR version 1.1.27 (Araya-Salas and Smith-Vidaurre 2017) in the R software version 4.1.3.

Taxonomy

Family Gryllidae
Subfamily Eneopterinae Saussure, 1874
Tribe Lebinthini Robillard, 2004

Subtribe Lebinthina Robillard & Tan, 2021

Common names.—Fairy-folk crickets, owing to their secretive high-frequency calling songs and the fact that they are abundant yet little-known species.

Genus *Diablotinthus* Robillard & Tan, gen. nov.
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Figs 1–5, 6A, 7

Type species.—*Diablotinthus lengguru* Robillard & Tan, **sp. nov.**

Common name.—Imp crickets.

Etymology.—The genus name refers to the diminutive size and the reddish head of the type species; the name is made up of the prefix "Diablotin," a folkloric impish creature (typically a small devil) often represented with a red head, and the suffix -inthus, referring to a Lebinthina genus.

Diagnosis.—Among the Lebinthina genera, *Diablotinthus* species are relatively small, brown colored, and brachypterous. This genus is similar to *Microbinthus* in its small size and stocky habitus, head with a wide rectangular fastigium, and male genitalia short and triangular with posterior pseudepiphallic lophi; but it differs by a harp with only a faint transverse oblique vein and false mirror not differentiated, and by male genitalia characterized by the sickle shape of the pseudepiphallic parameres, formed by two long and slender curved lobes.

Description.—Size small for the subtribe; shape stocky (Fig. 2). Dorsum of head rounded, with fastigium having margin broadly rounded, wider than long, much wider than scapes and than eyes (Fig. 3A). Head dorsum orange brown with faint brown bands (Fig. 3A). Eyes large and prominent (Fig. 3A–C). Head roundly triangular in facial view, slightly wider than high (Fig. 3B). Face smooth, coloration usually yellow brown to brown, between scapes slightly darker and ventrad of median ocellus with cream-colored transverse band (Fig. 3B). Maxillary palpi with segments yellow brown and elongated (Fig. 3C). Ocelli large, pale colored, forming rather wide triangle; median ocellus oval, lateral ocelli similarly sized and rounded (Fig. 3B). Scapes small. Antenna generally yellow brown. Lateral part of head yellow-brown, behind eye slightly darker (Fig. 3C). Pronotum dorsal disk trapezoidal, clearly wider than long, with numerous dark spots (especially near posterior margin) and longitudinal median dark band; its anterior and posterior margins straight, with rows of setae; lateral margins cream colored (Fig. 3A). Lateral lobes longer than wide; black dorsally, mottled with yellow ventrally

Fig. 1. Artist impression of the males of the three new taxa in their natural habitat; watercolor painting by Julien Nowak ©.

(Fig. 3C). Legs: TI with two tympana; inner tympanum covered by flat sclerotized expansion, its membrane visible along a small longitudinal slit only; outer tympanum ellipsoidal. TI and TII without subapical spine. TI with two inner and two outer apical spurs. TII with two inner and two outer apical spurs. FIII short and muscular. TIII serrulate over whole length, slightly furrowed longitudinally and with four pairs of subapical spurs and three pairs of apical spurs; inner spurs long and curved, outer spurs shorter and straight. Legs I and II light brown to yellow-brown, FI–II with brown spots and longitudinal patterns, TI–II with brown rings. TaIII-1 with four spines on dorsal outer edge and one on dorsal inner edge. TIII dark brown, spines and spurs brown with dark apices; Ta with basal half cream colored and distal half dark brown. FWs short, barely reaching abdomen mid-length; hind wings absent. Cerci well developed. Abdomen: Tergites dark brown.

Male: Metanotal glands absent. Dorsal field of FWs slightly longer than lateral field (Fig. 2A). FWs longer than wide, longer than pronotum dorsal disk (Fig. 2A). FW dark brown, with a longitudinal yellow band between veins M and R. FW venation (Fig. 3D): 1A vein (file) transverse and straight throughout but strongly curved (slightly less than 90°) at basal end. Diagonal vein strong, generally straight. Harp with one faint oblique vein, straight. CuA anterior part strong throughout, slightly curved inward near apex. Mirror (d1) rectangular, not differentiated. Apical field very short, with barely one cell alignments posterior to mirror. Lateral field with four strong longitudinal veins. Subgenital plate clog-shaped, apex truncated. Epiproct and subgenital plate brown.

Male genitalia (Fig. 4A–C): Pseudepiphallus triangular, about 1.5 longer than wide, its basal margin roundly indented in the middle, posterior apex forming two pseudepiphallic lophi. Pseudepiphallic lophi elongated, triangular, with rounded apices and very fine and short setae; area between lophi deeply and roundly emarginated. Rami shorter than pseudepiphallus length, parallel or slightly diverging anteriorly. Pseudepiphallic parameres average sized and strongly sclerotized, slender, and elongated, forming a sickle shape, including two inner curved

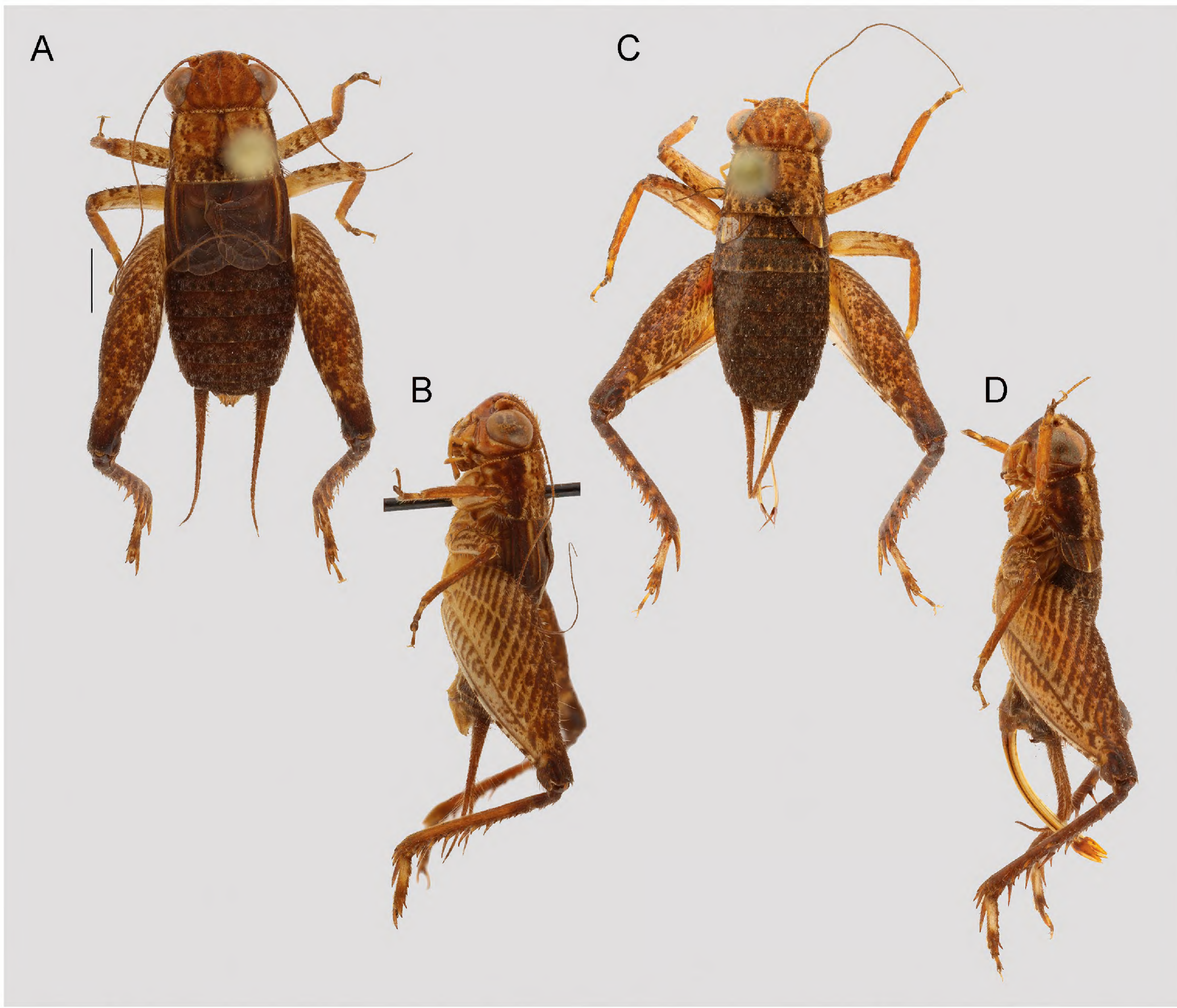

Fig. 2. *Diablotinthus lengguru* Robillard & Tan, **gen. et sp. nov.** habitus. **A, B.** Male; **C, D.** Female; **A, C.** Dorsal views; **B, D.** Lateral views. Scale bar: 2 mm.

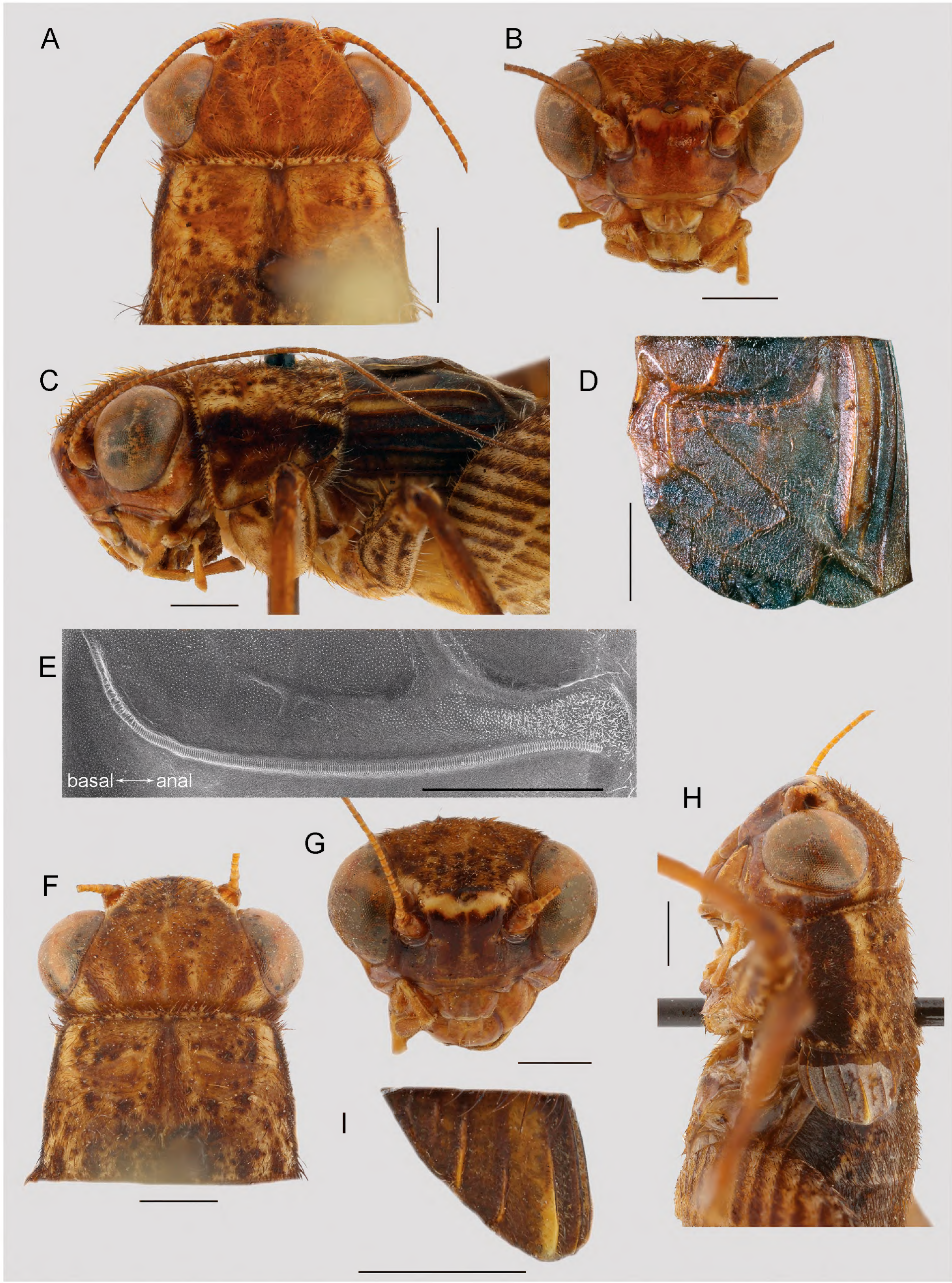

Fig. 3. *Diablotinthus lengguru* Robillard & Tan, **gen. et sp. nov. A–E.** Male; **F–I.** Female; **A, F.** Head and pronotum in dorsal view; **B, G.** Face in anterior view; **C, H.** Anterior part of body in lateral view; **D, I.** FW in dorsal view; **E.** Stridulatory file of right FW. Scale bars: 1 mm (all except **E**); 0.5 mm (E).

and slender lobes, their apex acute. Ectophallic apodemes long, faintly diverging anteriorly. Ectophallic arc well sclerotized, transverse, roundly curved posteriorly. Ectophallic fold with two ventral sclerites, slender, curved. Endophallic sclerite Y-shaped, comprising a long anterior region and a short median expansion and paired lateral arms posteriorly.

Female: FWs rudimentary, shorter than in male, not overlapping (Fig. 2C). Dorsal field dark brown, not translucent, with four strong yellow brown longitudinal veins; lateral field with four strong longitudinal veins (Fig. 3I). Dorsal field apex oblique, lateral field posterior margin oblique (Fig. 3I). Ovipositor shorter than FIII, apex slightly denticulate dorsally. Copulatory papilla elongated, slender; slightly dorso-laterally flattened, posterior end tapering into subacute apex (Fig. 4D, E).

Distribution.—Indonesia: Western part of New Guinea (West Papua) and Ambon Island (Maluku).

Included species.—

Diabotinthus lengguru Robillard & Tan, **sp. nov.**
Diablotinthus ambonensis (Robillard, 2010), **comb. nov.**

Diablotinthus lengguru Robillard & Tan, sp. nov.

https://zoobank.org/34E1CCDB-3D4C-4973-A510-F35784811570

Figs 1–5, 6A, 7

Specimens examined.—**Holotype:** INDONESIA • ♂; West Papua, Lobo (LOBO7); 3.7141944°S, 134.069333°E, 377 m; forêt proche PK8/ route Lobo–Kaimana forêt primaire entre camp et falaise [forest near PK8/ Lobo road—Kaimana primary forest between camp and cliff]; 21–30.X.2014, night; T Robillard leg.; lit [leaf litter]; LENG2014-TR246; MZB. **Paratypes:** • 1♂ West Papua, Lobo (LOBO1); 3.764667°S, 134.100111°E, 23 m; forêt littorale sur pente, autour du camp [coastal forest on slope, around the camp]; 21–30.X.2014, jour [day]; T Robillard leg.; MNHN-EO1294 • 1♀; West Papua, Lobo (LOBO1); 3.764667°S, 134.100111°E, 23 m; forêt littorale sur pente, autour du camp [coastal forest on slope, around the camp]; 21–30.X.2014, nuit [night]; T Robillard leg.; sur plante [on plant]; LENG2014-TR293; MNHN-EO1295 • 1♂; West Papua, Lobo (LOBO1); 3.764667°S, 134.100111°E, 23 m; forêt littorale sur pente, autour du camp [coastal forest on slope, around the camp]; 21–30.X.2014, night; T Robillard leg.; LENG2014-TR366; molecular sample L189; LENG2014-TR366; MZB • 1♂, 2♀; West Papua, Lobo (LOBO7); 3.7141944°S, 134.069333°E, 377 m; forêt proche PK8/ route Lobo–Kaimana forêt primaire entre camp et falaise [forest near PK8/ Lobo road—Kaimana primary forest between camp and cliff]; 21–30.X.2014, night; T Robillard leg.; LENG2014-TR247-249; molecular sample L114, L282; LENG2014-TR247, TR248, 249; MNHN-EO1296, EO1297, EO1298 • 1♂, 1♀; West Papua, Lobo (LOBO2); 3.767389°S, 134.097556°E, 32 m; forêt littorale sur pente, forêt secondaire/ anciennes plantations [coastal forest on slope, secondary forest/old plantations]; 21–30.X.2014, night; T Robillard leg.; molecular sample L190 (male); LENG2014-TR102, TR103; MZB • 1♂; West Papua, Lobo (LOBO6); 3.7033056°S, 134.071444°E, 221 m; forêt proche PK8/ route Lobo–Kaimana, crête prox. Camp, forêt primaire [forest near PK8/ Lobo road—Kaimana camp 200 m away, primary forest]; 21–30.X.2014, night; T Robillard leg.; LENG2014-TR225; MNHN-EO1299 • 1♂; same information as previous; SEM photos #2, LENG2014-TR226, nuit [night], litière [leaf litter], molecular sample L99; MNHN-EO1291 • 1♂; same information as previous; LENG2014-TR230, nuit [night], litière [leaf litter], call recording Takes 89-90 + video; MNHN-EO1300 • 2♀; West Papua, Lobo (LOBO4); 3.706417°S, 134.072139°E, 189 m; forêt proche PK8/ route Lobo–Kaimana camp à 200 m, forêt primaire [forest near PK8/ Lobo road—Kaimana camp 200 m away, primary forest]; 21–30.X.2014, day; T Robillard leg.; LENG2014-TR123-TR124; MZB • 2♂: West Papua, Urisa (URISA1); 3.2632778°S, 133.797556°E, 11 m; forêt karstique sur pente [karst forest on slope]; 3.XI.2014, day; T Robillard leg.; LENG2014-TR376; TR389, molecular sample L113, L191; MZB • 1♂; West Papua, Urisa (URISA1); 3.2632778°S, 133.797556°E, 11 m; forêt karstique sur pente [karst forest on slope]; 3.XI.2014, day; T Robillard leg.; LENG2014-TR372; litière [leaf litter]; molecular sample L98; call recording Pap113; MNHN-EO1338 • 1♀; West Papua, Urisa (URISA1); 3.2632778°S, 133.797556°E, 11 m; forêt karstique sur pente [karst forest on slope]; 3.XI.2014, jour [day]; T Robillard leg.; LENG2014-TR375; MNHN-EO1339 • 1♂; same information as previous; SEM photos #3, LENG2014-TR374, litière [leaf litter], molecular sample L192; MNHN-EO1292• 1♀; West Papua, Urisa (URISA2); 3.3366389°S, 133.824861°E, 19 m; forêt au bord du lac Sewiki [forest on the banks of Lake Sewiki]; 4–6.XI.2014, day; T Robillard leg.; LENG2014-TR543; MZB • 1♂, 1♀; West Papua, Kumawa (KUM2); 4.0688333°S, 133.036444°E, 27 m; forêt karstique sur pente [karst forest on slope]; 11–17.XI.2014, day; T Robillard leg.; LENG2014-TR530, TR529; ZRC • 1♀; West Papua, Kumawa (KUM2); 4.0688333°S, 133.036444°E, 27 m; forêt karstique sur pente [karst forest on slope]; 11–17.XI.2014, jour [day]; T Robillard leg.; LENG2014-TR527; molecular sample GR.114; MNHN-EO1340 • 1♂; same information as previous; LENG2014-TR531; MNHN-EO1341 • 1♂, 1♀; West Papua, Kumawa (KUM2); 4.0688333°S, 133.036444°E, 27 m; forêt karstique sur pente [karst forest on slope]; 11–17.XI.2014, day; T Robillard leg.; LENG2014-TR592, TR594; molecular sample L194; KSP • 1♂, 3♀; West Papua, Kumawa (KUM2); 4.0688333°S, 133.036444°E, 27 m; forêt karstique sur pente [karst forest on slope]; 11–17.XI.2014, day; T Robillard leg.; LENG2014-TR528, TR595; MZB • 1♀; West Papua, Kumawa (KUM4); 4.0555°S, 133.066333°E, 47 m; forêt karstique sur pente [karst forest on slope]; 16.XI.2014, jour [day]; T Robillard leg.; litière [leaf litter]; LENG2014-TR613; MNHN-EO1342 •1 ♂; same information as previous; SEM photos #4; LENG2014-TR653, molecular sample L97; MNHN-EO1293 • 1♂, 1♀; West Papua, Kaimana (GPSKAI2); 3.644639°S, 133.754556°E, 56 m; forêt littorale sur pente [coastal forest on slope]; 18.X.2014, day; T Robillard leg.; LENG2014-TR26, TR369; ANSP • 4♂, 1♀; West Papua, Kaimana (GPSKAI2); 3.644639°S, 133.754556°E, 56 m; forêt littorale sur pente [coastal forest on slope]; 18.X.2014; jour [day]; T Robillard leg.; LENG2014-TR652, TR2, TR24, TR23, TR280; molecular sample L96 (TR652), L196 (TR2), L279 (TR280); MZB • 1♂; West Papua, Kaimana (GPSKAI2); 3.644639°S, 133.754556°E, 56 m; forêt littorale sur pente [coastal forest on slope]; 18.X.2014; nuit [night]; T Robillard leg.; LENG2014-TR13; call recording Take Pap79; SEM photos #1; MNHN-EO1290 • 3♂, 1♀; West Papua, Kaimana (GPSKAI2); 3.644639°S, 133.754556°E, 56 m; forêt littorale sur pente [coastal forest on slope]; 18.X.2014; jour [day]; T Robillard leg.; LENG2014-TR281, TR387, TR25, TR28; molecular sample L112 (TR281), MNHN-EO1343, EO1344, EO1345, EO1346 • 2♂, 1♀; West Papua, Kaimana (GPSKAI3); 3.643667°S, 133.757028°E, 200 m; forêt littorale sur pente [coastal forest on slope]; 19.X.2014; jour [day]; T Robillard leg.; LENG2014-TR21, TR22, TR27; molecular sample L195 (TR22); MNHN-EO1347, EO1348, EO1349.

Additional material examined.—INDONESIA, West Papua, Lengguru region: 12 juveniles; MNHN • 1 juvenile; West Papua, Kumawa (KUM2); 4.0688333°S, 133.036444°E, 27 m; forêt karstique sur pente [karst forest on slope]; 11–17.XI.2014, day; T Robillard leg.; LENG2014-TR532; molecular sample L281; MZB • 1 juvenile; West Papua, Kumawa (KUM2); 4.0688333°S, 133.036444°E, 27 m; forêt karstique sur pente [karst forest on slope]; 11–17.XI.2014, day; T Robillard leg.; LENG2014-TR532; molecular sample L281; MZB • 1 juvenile; West Papua, Urisa (URISA2); 3.3366389°S, 133.824861°E, 19 m; forêt au bord du lac Sewiki [forest on the banks of Lake Sewiki]; 4–6.XI.2014, day; T Robillard leg.; LENG2014-TR465; molecular sample L280; MZB.

Type locality.—INDONESIA, West Papua, Kaimana Regency, Lengguru region.

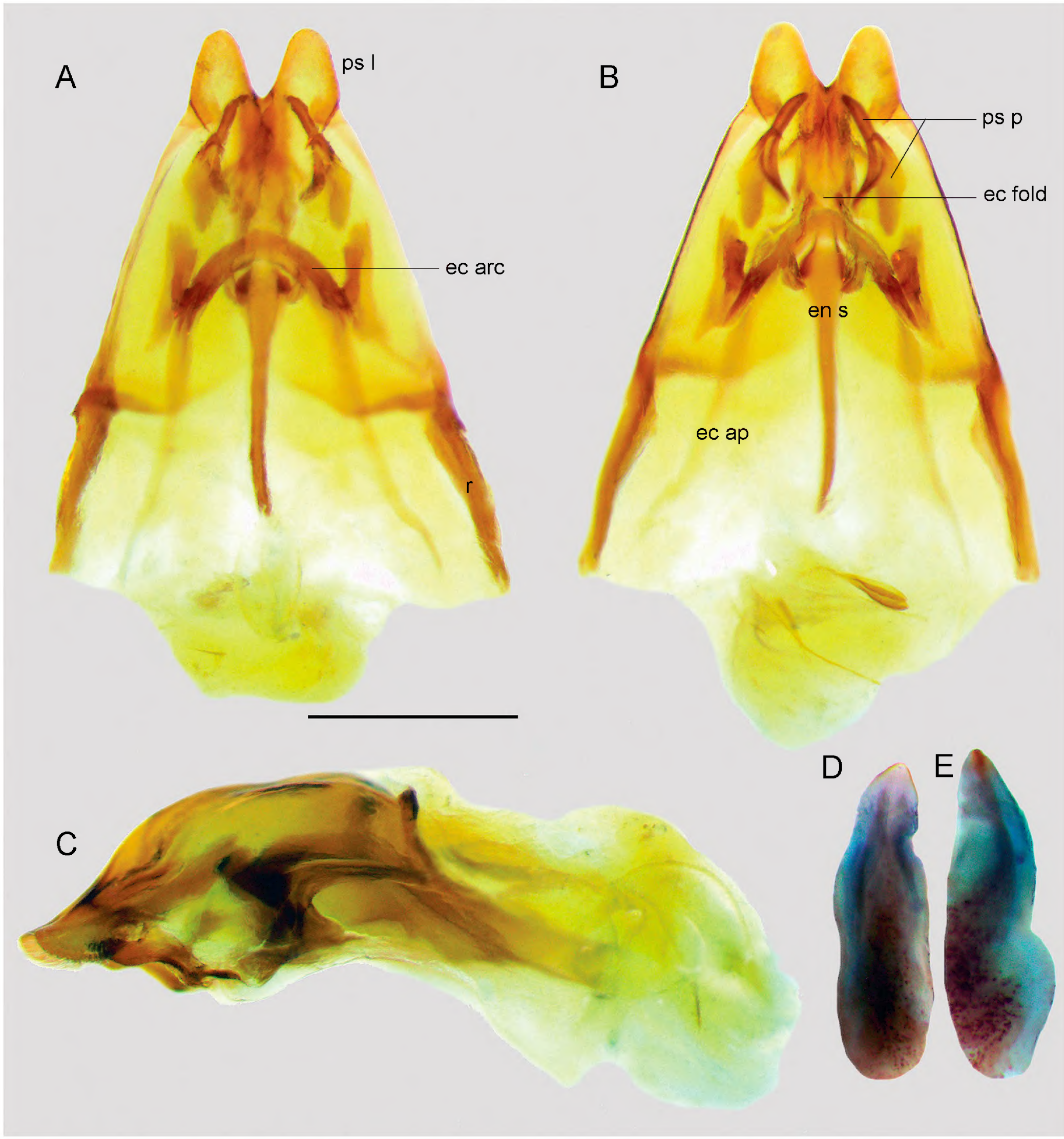

Fig. 4. *Diablotinthus lengguru* Robillard & Tan, **gen. et sp. nov.** genitalia. **A–C.** Male genitalia; **D, E.** Female papilla; **A, D.** Dorsal view; **B.** Ventral view; **C, E.** Lateral view. Scale bar: 0.5 mm.

Common name.—Lengguru imp crickets.

Etymology.—This species is named after the Lengguru massif in West Papua, where the species lives; noun in apposition.

Diagnosis.—This species can be characterized by its small size, stocky habitus, and coloration dark brown with orange-brown head dorsum and male genitalia short and triangular with triangular posterior pseudepiphallic lophi. The new species is very similar to *D. ambonensis*, from which it differs by a lighter coloration, including orangish head dorsum, and male genitalia stockier, including wider pseudepiphallus and pseudepiphallic lophi shorter and more triangular, and endophallic sclerite longer anteriorly and thinner.

Description.—Small size (Fig. 2). Dorsum of head, including fastigium, orange-brown with six faint brown bands (Fig. 3A). Margins of fastigium cream-colored (Fig. 3A). Eyes occupying about 0.33 times of head width in dorsal view. Scape yellow brown. Fastigium verticis with transverse band cream colored, frons brown to dark brown, and clypeus yellow brown (Fig. 3B). Gena yellow brown (Fig. 3C). Pronotal disk mostly yellow brown, with numerous small dark spots (especially near posterior margin) and longitudinal median dark band; lateral margins cream colored (Fig. 3A). Lateral lobe mostly black dorsally, its ventral margin mottled with yellow (Fig. 3C). FI and FII cream colored with dorsal part having numerous dark spots; TI and TII mostly brown. FIII cream colored, with numerous oblique dark-brown bands, dorsum mottled dark brown; knee dark brown. TIII generally dark brown with brown spurs.

Male: FW reaching before middle of fourth tergite. FW coloration (Fig. 3D): Dorsal field cells and veins mostly brown; M and R and plectrum area yellow brown. Lateral field very dark brown, with ventral region more yellow brown. FW venation as in genus description. Stridulatory file with about 216 (min. 210–max. 224 teeth) closely spaced and stout teeth and about 10 (min. 7–max. 13 teeth) irregularly shaped and robust teeth at the basal end (n = 4 males).

Male genitalia: (Fig. 4A–C) As in genus description. Pseudepiphallus forming an equilateral triangle. Pseudepiphallic lophi short and triangular. Endophallic sclerite with a thin and very elongate anterior part.

Female: FW reaching before middle of third tergite; dorsal field with lateral margin having tint of yellow (Fig. 3I).

Juvenile: Characterized by the orange-red head more distinctive than in adults; body gray brown (Fig. 5A).

Variations: Some individuals are darker in overall coloration than others. There are also some size variations.

Fig. 5. *Diablotinthus lengguru* Robillard & Tan, **gen. et sp. nov.** in their environment. **A.** Juvenile; **B.** Natural habitat; **C.** Male adult; **D.** Female adult feeding on a rotten fallen fruit in the forest floor.

Table 1. Measurements (in mm) of *Diablotinthus lengguru* **sp. nov.**: mean (min.–max.).

	BL	PronL	PronW	FWL	FWW	FIIIL	FIIIW	TIIIL	OL
Holotype male	11.0	2.4	3.5	2.9	2.5	8.4	3.3	6.2	
Males (n = 11)	11.3 (10.6–12.9)	2.3 (2.1–2.5)	3.6 (3.4–3.8)	2.7 (2.5–3.0)	2.7 (2.3–2.9)	8.0 (7.2–8.7)	3.1 (2.7–3.5)	5.5 (5.0–5.9)	
Females (n = 9)	11.0 (10.2–12.0)	2.2 (2.2–2.3)	3.5 (3.3–3.8)	0.9 (0.7–1.1)	1.1 (0.8–1.3)	7.8 (7.3–8.6)	3.1 (3.0–3.4)	5.2 (4.9–5.5)	5.4 (4.8–6.2)

Measurements.—See Table 1.

Distribution.—West Papua: Kaimana Regency (Lobo (Kaimana District), Urisa (Arguni Bawah District), Kumawa (Buruway District) and Kaimana (Fig. 6A).

Ecology.—This species is found on the forest floor (Fig. 5B) and is abundant among leaf litter during day and night time (Fig. 5C). This species is probably detritivores and was observed to feed on decaying fruits in the leaf litter (Fig. 5D).

Calling song.—(Fig. 7) Consists of echemes that can vary in the number of syllables and duration. The average echeme duration is 0.32±0.9 s (0.20–0.48 s) made up of 10±4 (5–16 syllables), with an average echeme period of 0.91±0.22 s (0.57–1.22 s). At times, the echemes may extend to become a continuous trill. The average interval between consecutive echemes is 0.59±0.16 s (0.35–0.88 s). Each echeme is made up of discrete syllables with an average duration of 8.8±2.1 ms (6.2–12.3 ms) and period of 36.8±9.1 ms (26.1–54.7 ms). The average downtime interval between consecutive syllables is 28.0±7.7 ms (19.1–48.2 ms). The frequency spectrum shows a broadband dominant frequency from 25 to 30 kHz, dominating at 26.3±1.1 kHz (24.7–28.0 kHz); this band corresponds to the second peak of a harmonic series, with a highly attenuated fundamental peak at about 13 kHz.

Diablotinthus ambonensis (Robillard, 2010), comb. nov.

Lebinthus ambonensis Robillard, 2010: 27; Baroga-Barbecho et al. 2020: 405 (*incertae sedis*); Cigliano et al. 2024 (Orthoptera species file)

Holotype.—INDONESIA • ♂; Province Maluku: Ambon [Is.], Gunung Seliman; 3 Sept. 1995; leg. R. de Jong; RMNH [from Robillard 2010].

Common name.—Ambon imp crickets.

Remark.—The species is known only from the holotype specimen. While being very similar to the type species (*D. ambonensis*), *D. ambonensis* differs by male genitalia and details of coloration.

Genus *Lutinthus* Robillard & Tan, gen. nov.

https://zoobank.org/E1097974-8C5E-4274-A675-5926861E9D8D

Figs 1, 6A, 8–10

Type species.—*Lutinthus timika* Robillard & Tan, **gen. et sp. nov.**

Common name.—Elvish crickets.

Etymology.—The genus name is made up of the prefix Lut, referring to the French word "Lutin" (a folkloric elvish forest creature) referencing the rather slender shape of these crickets, and the suffix -inthus, referring to a Lebinthina genus.

Diagnosis.—Among the Lebinthina genera, *Lutinthus* is medium sized, with a characteristic dark brown coloration and short FWs with dorsal field slightly shorter than lateral field, as in the genus *Agnothecous*. This genus is most similar to *Rugabinthus* by the shape of harp oblique veins, and the posterior pseudepiphallic lophi little differentiated, but it strikingly differs by the following characters: the harp lacks the characteristic fold of *Rugabinthus* along the diagonal vein, it has a large and rectangular fastigium with its fastigium verticis distinctly wider than the width of eye in anterior view (instead of about as wide or narrower than width of eye in *Rugabinthus*); the frons and fastigium verticis is also finely rugulose (instead of smooth in *Rugabinthus*). This genus is also similar to *Gnominthus* by the whitish face and mouth parts and general shape of its male genitalia; but it differs by its more slender shape and absence of median bump in the harp and by male genitalia with posterior part of pseudepiphallus more elongated, pseudepiphallic parameres rounded, and lamellae of endophallic sclerite more broadly expanded externally.

Description.—Size medium, shape slender for the subtribe (Fig. 8). Dorsum of head rounded, prolonged by rectangular fastigium that is distinctly wider than long, its lateral margins angular (Fig. 9A). Head dorsum uniformly black (Fig. 9A). Eyes large but little prominent laterally (Fig. 9A–C). Head roundly triangular in facial view, almost as wide as high (Fig. 9B). Face finely rugulose, with a cream-colored mask, surrounded by dark lateral parts (Fig. 9B). Ocelli large, pale colored, forming a rather wide triangle; median ocellus rounded, lateral ocelli similar sized and rounded (Fig. 9B). Presence of two large ocelli-like fenestrae near scapes. Scapes small, Pronotum dorsal disk trapezoidal, wider than long, its anterior margin distinctly emarginated in the middle, posterior margin straight, mostly black (Fig. 9A). Lateral lobes of pronotum longer than wide; uniformly black (Fig. 9C). Legs: TI with two tympana; inner tympanum covered by flat sclerotized expansion, its membrane visible along a small longitudinal slit only; outer tympanum ellipsoidal. TI and TII without subapical spine. TI with two inner and two outer apical spurs. TII with two inner and two outer apical spurs. FIII long and muscular. TIII serrulated on their whole length, slightly furrowed longitudinally and with four pairs of subapical spurs and three pairs of apical spurs; inner spurs long and curved, outer spurs shorter and straight. Legs I and II light brown to yellow brown, Fs with brown spots and longitudinal patterns, Ts with rings. TaIII-1 with four spines on dorsal outer edge and none on dorsal inner edge. TIIIs and tarsomeres brown with spines and spurs with dark apices. FWs short, barely reaching abdomen mid-length; hind wings absent. Cerci well developed. Abdomen: Tergites dark brown, with faint pale spots along posterior margins.

Male: Metanotal glands absent. Dorsal field of FWs slightly shorter than lateral field (Fig. 9D). FWs longer than wide, longer than pronotum dorsal disk. FW venation (Fig. 9D): 1A vein (file) transverse and straight throughout, but strongly curved (~90°) at basal end with a wide sclerotized inner margin near plectrum. Diagonal vein very faint anteriorly. Harp without a fold along diagonal, triangular, longer than wide occupying approximately half of

dorsal field surface, with two faint oblique veins, one transverse, one curved anteriorly along 1A and connected to CuA. CuA anterior part strong throughout, slightly curved inward near apex. Mirror (d1) slightly differentiated from other cells of D alignment, forming a wide polygonal cell, not rounded, separated from harp by an anterior fold. Cell d2 very thin along d1. Apical field very short, made of few cells in E alignment only. Lateral field with four strong longitudinal veins. Subgenital plate elongated, clog-shaped. Epiproct and subgenital plate brown.

Male genitalia: (Fig. 10) Pseudepiphallus triangular, elongate, its basal margin slightly indented in the middle, posterior apex forming a wide rounded plate, without paired lophi. Rami shorter than half the pseudepiphallus length, slightly converging anteriorly. Pseudepiphallic parameres forming a rounded plate with a small inner rounded lobe posteriorly. Ectophallic fold with two faint parallel ventral sclerites. Endophallic sclerite large, Y-shaped, comprising a long anterior region and a short median expansion and lateral arms posteriorly.

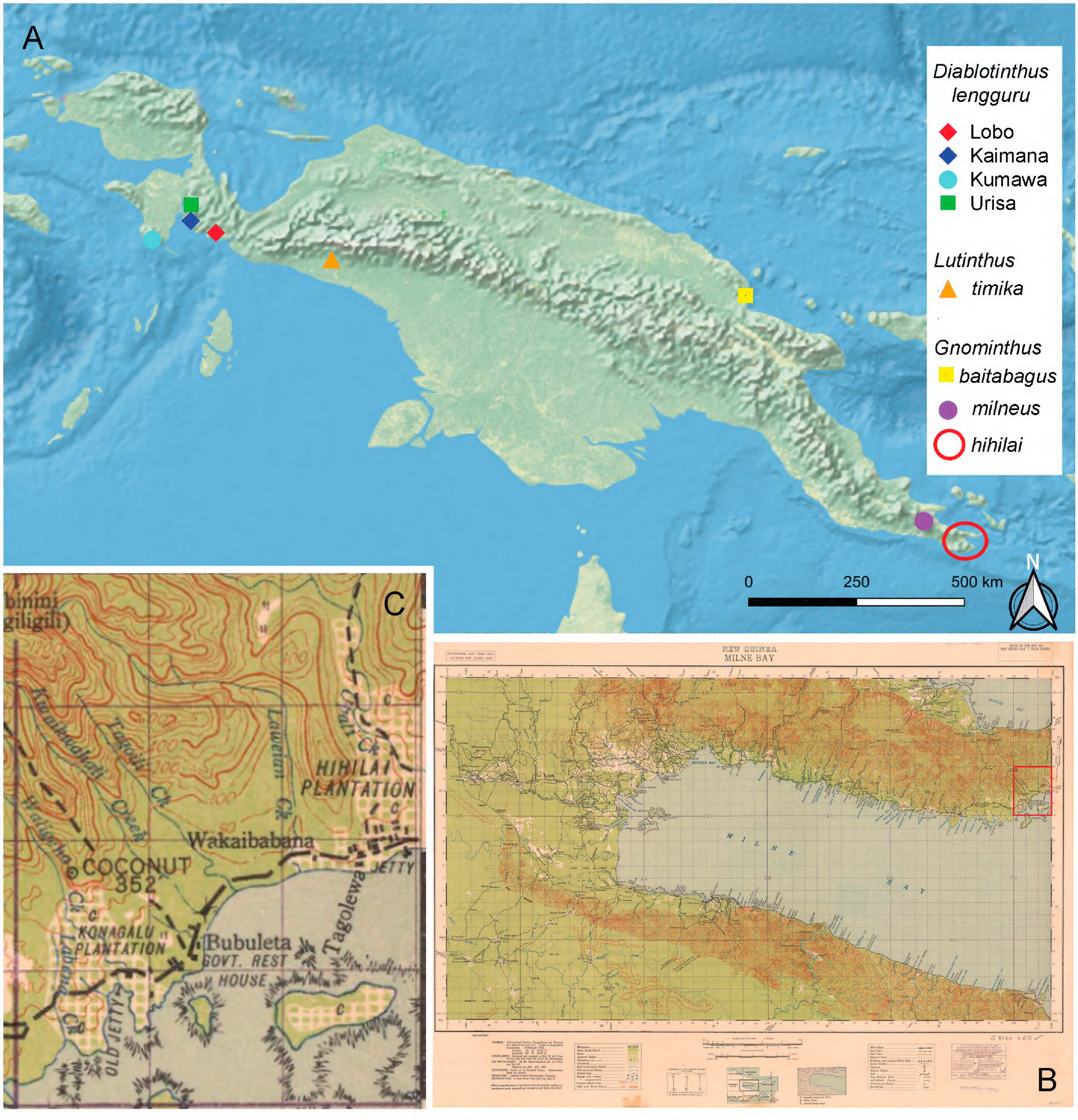

Fig. 6. A. Map of New Guinea showing the distribution of *Diablotinthus lengguru* Robillard & Tan, **gen. et sp. nov.**, *Lutinthus timika* Robillard & Tan, **gen. et sp. nov.** and *Gnominthus hihilai* Robillard & Tan, **sp. nov. B.** Old map of Milne Bay surveyed and compiled in May 1943 by the Australia Army Field Survey Company, 3rd (Out of Copyright, available: https://nla.gov.au/nla.obj-233566967/view). Scale 1:63360. **C.** The locality of Hihilai Plantation (coconut).

Female: Unknown.

Distribution.—Indonesia: south west of New Guinea (Central Papua Province) (Fig. 6A).

Included species.—

Lutinthus timika Robillard & Tan, **gen. et sp. nov.**

***Lutinthus timika* Robillard & Tan, sp. nov.**

https://zoobank.org/E56BDDA3-3249-4C05-9863-279CC088380E

Figs 1, 6A, 8–10

Specimens examined.—**Holotype:** INDONESIA • ♂; Irian Jaya [Central Papua Province], Timika, Freeport Concession, Kuala Kencana, lowland rainforest, near sewage plant; 4°26.21'S, 136°51.84'E;

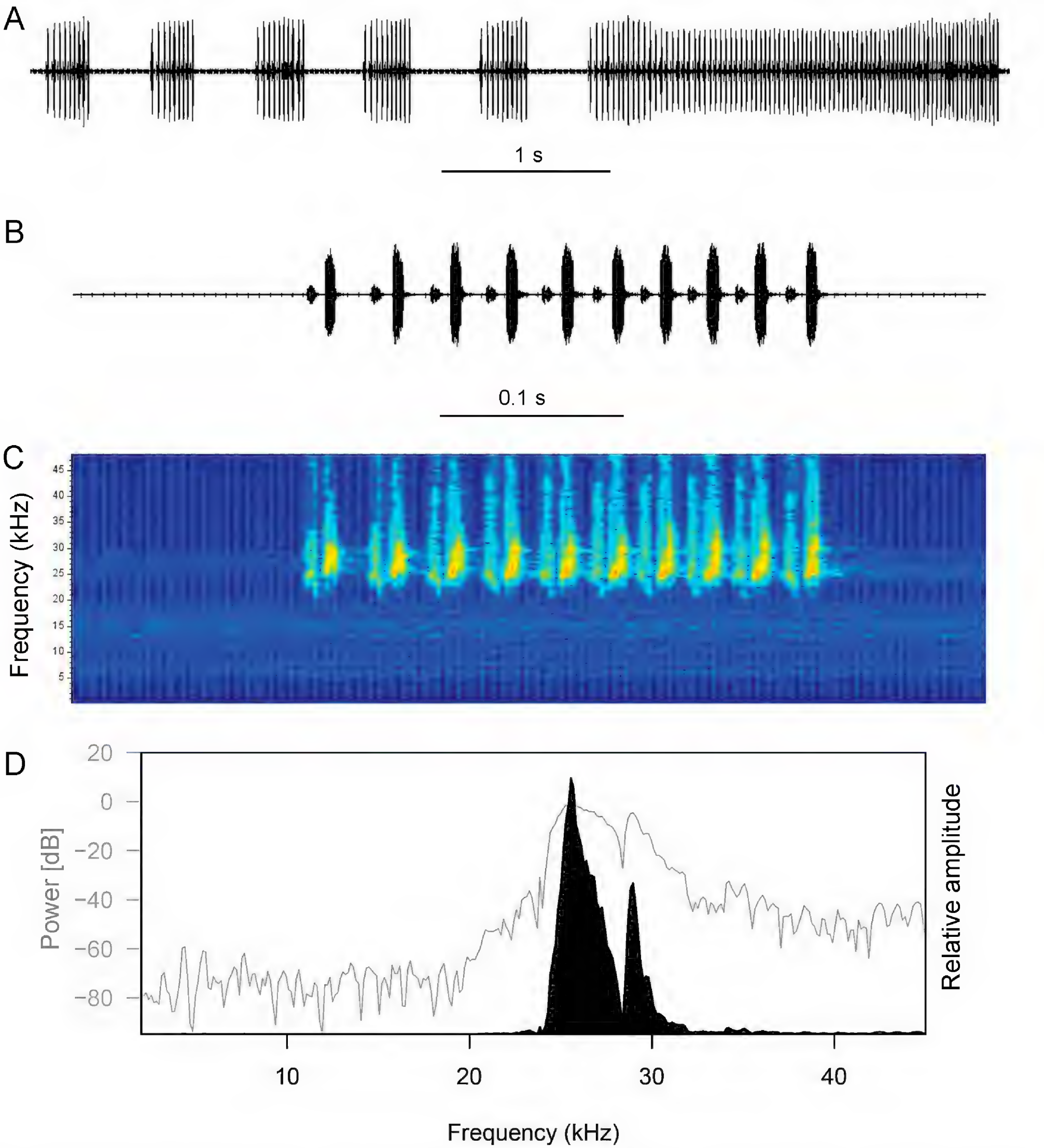

Fig. 7. *Diablotinthus lengguru* Robillard & Tan, **gen. et sp. nov.** male calling song. **A.** Oscillograms showing five echemes and one continuous trill; **B.** Oscillogram showing one echeme consisting of 10 syllables; **C.** Spectrogram of the same echeme; **D.** Power spectra of a syllable where the gray line represents the power [dB] (axis name and scale in gray) and the black solid peak represents the relative amplitude (axis name in black).

100 m; 17–24 March 1997; S. Miller, D. Peggie, R. Ubaidillah leg.; malaise trap 1 (Site 6); molecular sample Nsp2; MZB-97019. **Paratype**: INDONESIA • 1♂; Irian Jaya [West Papua], Timika, Freeport Concession, Kali Kopi malaise trap 1; 18 January–March 1997, Freeport insect survey leg.; molecular sample L13/GR145 (MZB-97064); MNHN-ENSIF3551.

Type locality.—INDONESIA, Irian Jaya [Central Papua Province], Timika.

Common name.—Timika elvish crickets.

Etymology.—This species is named after the type locality, Timika; noun in apposition.

Diagnosis.—This species can be characterized by the enlarged and rectangular fastigium; finely rugulose fastigium verticis and frons; white scapes, fastigium verticis, frons and mouthparts; slight fold on harp vein and shape of male pseudepiphallus.

Description.—Average size, shape slender (Fig. 8). Dorsum of head, including fastigium, black (Fig. 9A). Margins of fastigium cream-colored (Fig. 9A). Eyes occupying 41% of head width in dorsal view. Lateral part of head black with a faint narrow yellow band behind eyes (Fig. 9C). Maxillary palpi with apical and subapical segments creamed colored (slightly darkened apically), other segments black (Fig. 9C). Scapes cream colored with tint of black especially on dorsal surface. Antenna with basal segments cream colored with tint of black, otherwise dark. Fastigium verticis, frons and clypeus unicolourous cream colored (Fig. 9B). Gena black with parts anterior of eyes cream colored. Pronotal dorsal disk mostly black with faint yellow brown bands near lateral parts (Fig. 9C). FIs and FIIs cream colored with dark spots near apices; TIs and TIIs black with yellow rings in middle. FIIIs dark in dorsal half, more brownish in ventral half with some light spots. TIIIs generally very dark brown with brown spurs.

Male: FW reaching middle of fourth tergite. FW coloration (Fig. 9D): Dorsal field cells and veins mostly dark brown; M and R and plectrum area yellow brown; with cream-colored spot near base of CuA and smaller cream-colored spot near apex of R.

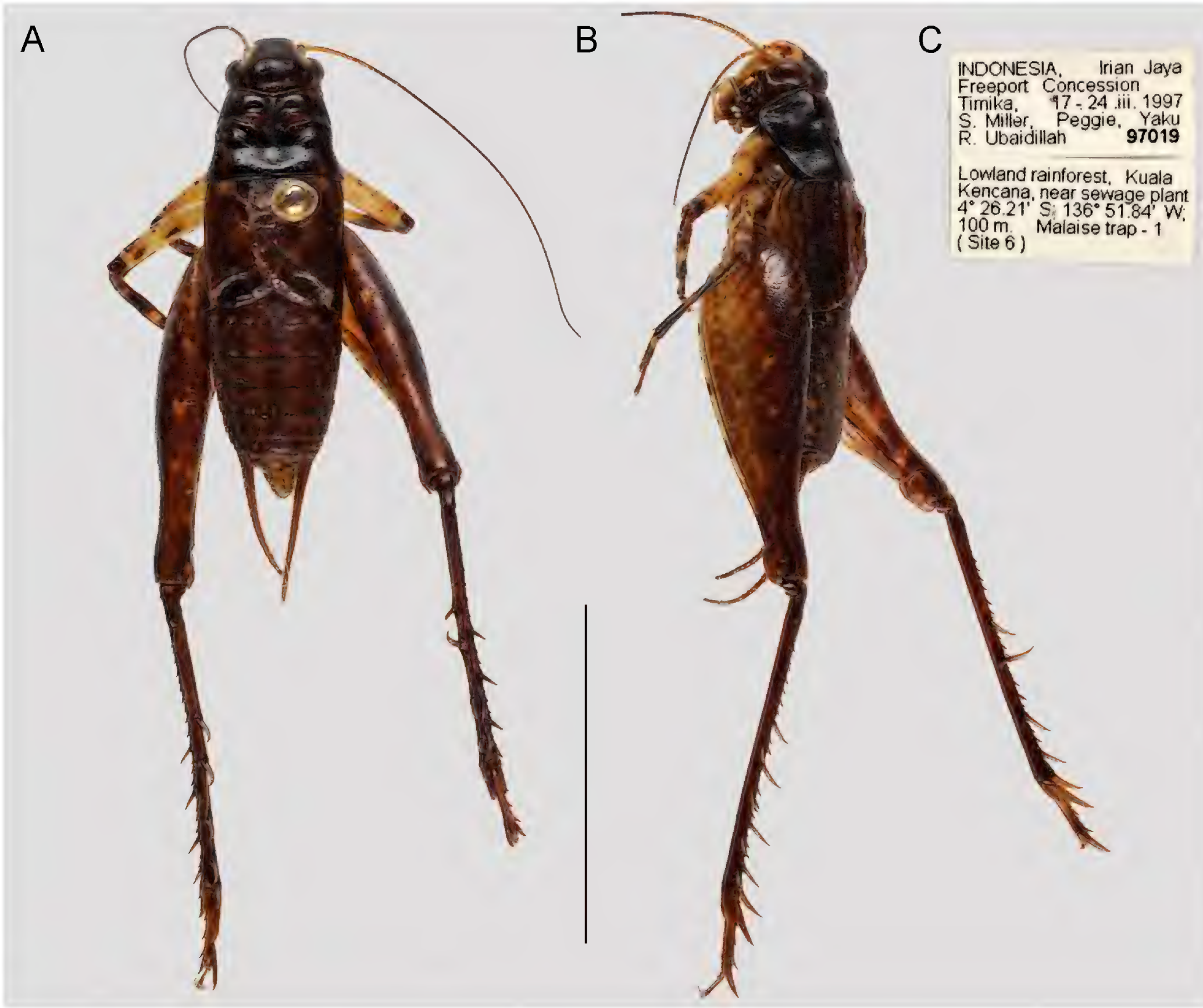

Fig. 8. *Lutinthus timika* Robillard & Tan, **gen. et sp. nov.** male habitus. **A.** Dorsal view; **B.** Lateral view; **C.** Specimen label. Scale bar: 1 cm.

Lateral field dark brown, with ventral region progressively more yellow-brown. FW venation as in genus description.

Male genitalia: (Fig. 10) As in genus description.

Variations: Male paratype is slightly lighter in general coloration than male holotype.

Measurements.—See Table 2.

Genus *Gnominthus* Robillard & Vicente, 2015

Gnominthus Robillard & Vicente, 2015: 83—Robillard et al. 2016: 167; Vicente et al. 2017: 2204; Tan and Robillard 2021: 585.

Type species.—*Gnominthus baitabagus* Vicente & Robillard, 2015, by monotypy and original designation.

Common name.—Gnome crickets.

Distribution.—Papua New Guinea: eastern part of New Guinea

Included species.—
Gnominthus baitabagus Vicente & Robillard, 2015
Gnominthus hihilai Robillard & Tan, **sp. nov.**
Gnominthus milneus Robillard & Tan, 2021

Gnominthus hihilai Robillard & Tan, sp. nov.

https://zoobank.org/76025E63-D2DB-4211-B62C-35DC207ABCF9
Figs 1, 6, 11–13

Specimens examined.—**Holotype:** PAPUA NEW GUINEA • ♂; Milne Bay, Hihilai Plantation [10.32522°S, 150.66072°E], coconut

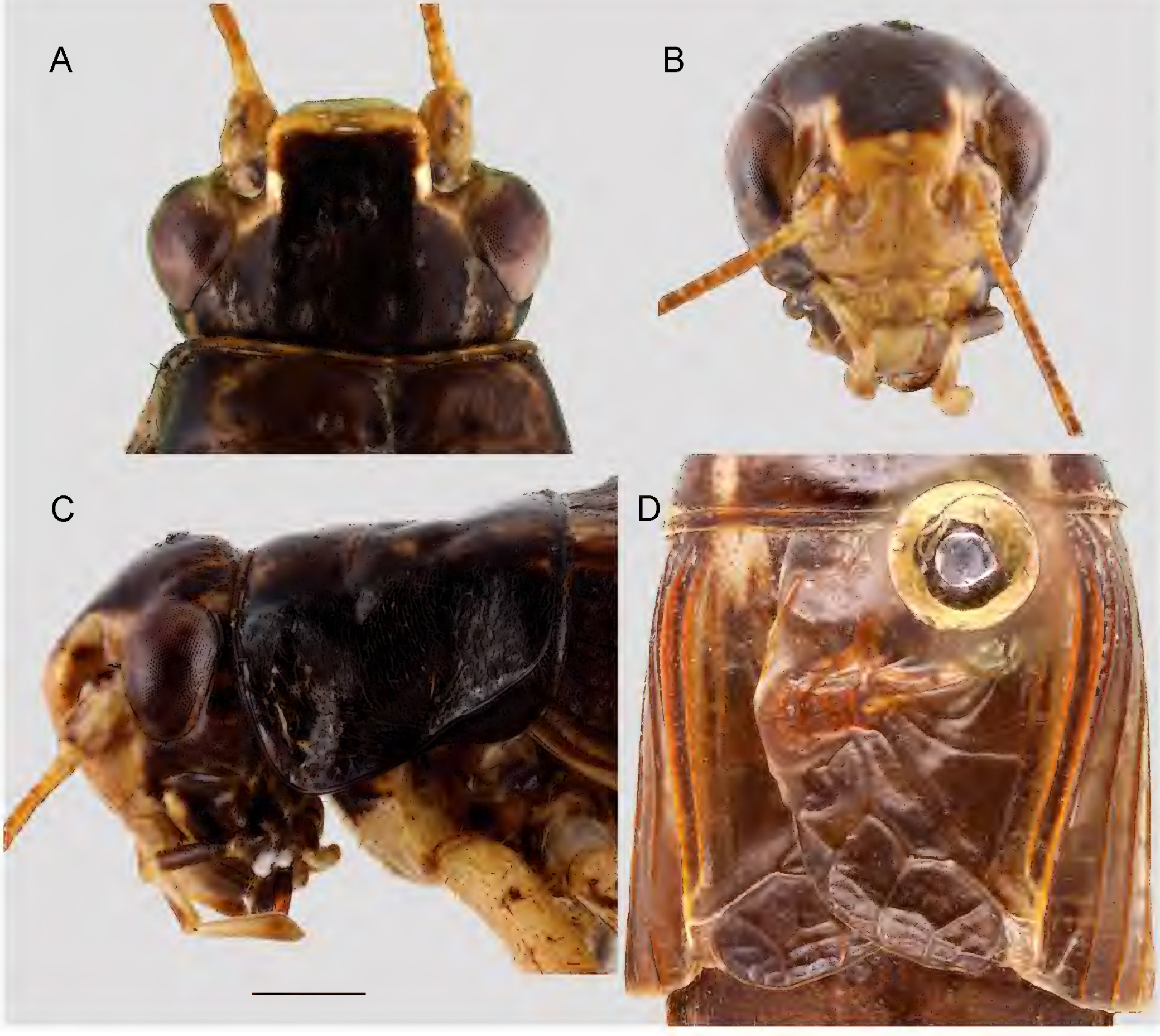

Fig. 9. *Lutinthus timika* Robillard & Tan, **gen. et sp. nov.** male. **A.** Head and pronotum in dorsal view; **B.** Face in anterior view; **C.** Anterior part of body in lateral view; **D.** FW in dorsal view. Scale bar: 1 mm.

Table 2. Measurements (in mm) of *Lutinthus timika* **gen. et sp. nov.**

	BL	PronL	PronW	FWL	FWW	FIIIL	FIIIW	TIIIL
Holotype (MZB-97019)	14.1	2.8	3.9	4.2	3.1	11.0	3.7	8.9
Paratype (MZB-97064)	13.8	2.9	3.8	4.0	3.2	10.7	3.7	9.4

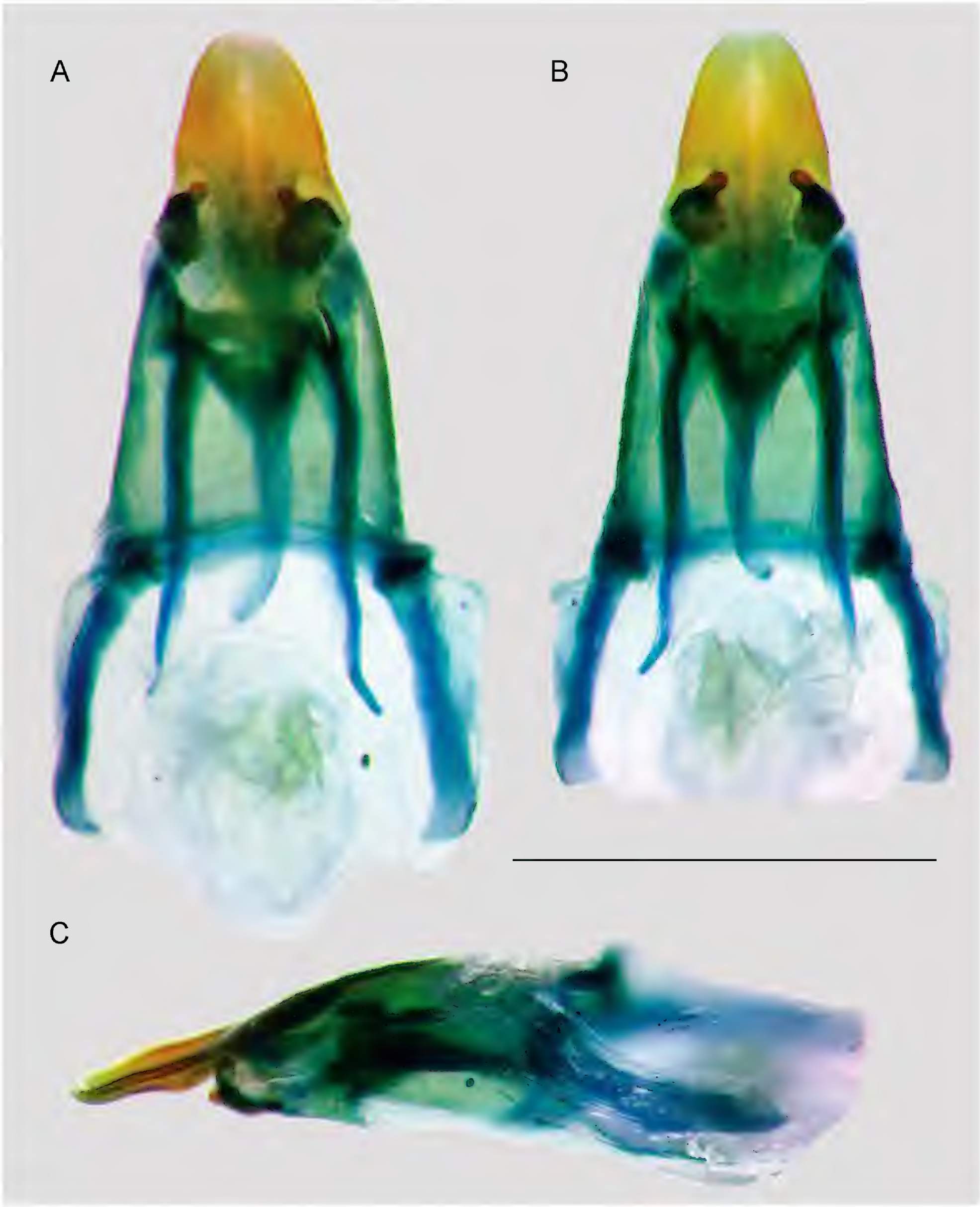

Fig. 10. *Lutinthus timika* Robillard & Tan, **gen. et sp. nov.** male genitalia. **A.** Dorsal view; **B.** Ventral view; **C.** Lateral view. Scale bar: 1 mm.

plantation; 27.IV.1944; Helwig leg; ANSP. **Paratype**: PAPUA NEW GUINEA • 1♂; same data as for holotype; molecular sample L226 (ANSP); MNHN-EO1289.

Type locality.—PAPUA NEW GUINEA: Milne Bay District, Hihilai Plantation (Fig. 6).

Common name.—Hihilai gnome crickets.

Etymology.—This species is named after type locality, Hihilai Plantation; noun in apposition.

Diagnosis.—The new species differs from *G. baitabagus* Vicente & Robillard, 2015 and *G. milneus* Robillard & Tan, 2021 by the relatively uniform dark brown coloration of the face, and by the male genitalia having the apical part of its pseudepiphallus tongue-shaped with subacute apex (instead of stouter and truncated, or forked into short paired lophi, respectively).

Description.—Habitus similar in size and general shape to other congeners (Fig. 11). Vertex and fastigium yellow brown. Dorsum of head yellow brown with six longitudinal dark bands at posterior end (Fig. 12A); back of eyes with dark band. Scapes pale yellow brown, ventrally dark colored. Antennae orange-brown. Face generally dark brown, with vertical band at middle very faintly cream colored; fastigium verticis with two spots faintly cream colored; frons above mouthparts with narrow cream-colored transverse band (Fig. 12B). Mouthparts mostly dark brown; labrum sometimes with faint cream-colored patch at middle; maxillary palpi with segments generally cream colored, apical segment with apical part dark, third segment dorsally dark (Fig. 12C). Lateral parts of head mostly dark brown (Fig. 12C). Pronotum dorsal disk yellow-brown mottled with black, lateral margin slightly lighter in coloration, anterior margin faintly concave, posterior margin straight (Fig. 12A); lateral lobes mostly dark brown (Fig. 12C). Legs: FI–II light brown with faint brown spots; TI–II brown; Ta-I and Ta-III of each leg yellow basally then dark brown; FIII yellow brown with numerous oblique brown bands and spots, knees dark brown; TIII homogeneously red brown. Abdomen dark red brown. Cerci dark brown.

Male: FW reaching middle of fifth tergite. FW coloration (Fig. 12D): Dorsal field cells and veins mostly dark brown. Lateral field darker brown than dorsal field, with ventral region progressively yellow brown. FW venation (Fig. 12D): 1A vein (file) transverse and sinuous but strongly curved (>90°) at basal end. Diagonal vein strong, mostly straight. Harp longer than wide, occupying approximately half of dorsal field surface; harp with two oblique veins: one strong and angularly sinuous, delimiting a black median bump, one thinner and more anterior. CuA anterior part strong throughout, slightly curved inward near apex. Mirror (d1) small and not differentiated from other cells of D alignment. Cell c1 crossed by one transverse vein. Apical field very short, including only a few cells in E alignments. Lateral field with four strong longitudinal veins. Subgenital plate elongated, clog-shaped. Epiproct and subgenital plate brown.

Male genitalia: (Fig. 13) Pseudepiphallus triangular, very elongate, its basal margin slightly indented at middle, posterior apex tongue-shaped with apical margin rounded without paired lophi. Rami shorter than half the pseudepiphallus length, slightly diverging anteriorly. Pseudepiphallic parameres average sized and strongly sclerotized, basal half in lateral view with triangular pro-

Fig. 11. *Gnominthus hihilai* Robillard & Tan, **sp. nov.** male habitus. **A.** Dorsal view; **B.** Lateral view; **C.** Specimen label. Scale bar: 2 mm.

cess, apical half in dorsal view forming stout lobe tongue shaped. Ectophallic apodemes parallel and long, extending anteriorly beyond the anterior margin of pseudepiphallus. Ectophallic arc well sclerotized, transverse. Ectophallic fold with two ventral weakly sclerotized sclerites. Endophallic sclerite Y-shaped, comprising a long anterior region and a short median expansion and lateral arms posteriorly.

Measurements.—See Table 3.

Table 3. Measurements (in mm) of *Gnominthus hihilai* **sp. nov.**

		BL	PronL	PronW	FWL	FWW	FIIIL	FIIIW	TIIIL
Holotype	male	13.3	2.8	3.8	3.3	2.6	10.5	3.9	8.0
Paratype MNHN-EO1289	male	13.7	2.7	3.9	3.1	2.5	10.1	3.8	7.7

Discussion

Here, we described two new genera—*Diablotinthus* **gen. nov.** and *Lutinthus* **gen. nov.**—and three new species—*Diablotinthus lengguru* **sp. nov.**, *Lutinthus timika* **sp. nov.**, and *Gnominthus hihilai* **sp. nov.**—from New Guinea. This is part of a continued effort to document the species diversity of Lebinthina in this biodiversity hotspot (e.g., Robillard 2011, Vicente et al. 2015, Robillard et al. 2016, Tan and Robillard 2021, 2022) and eventually better

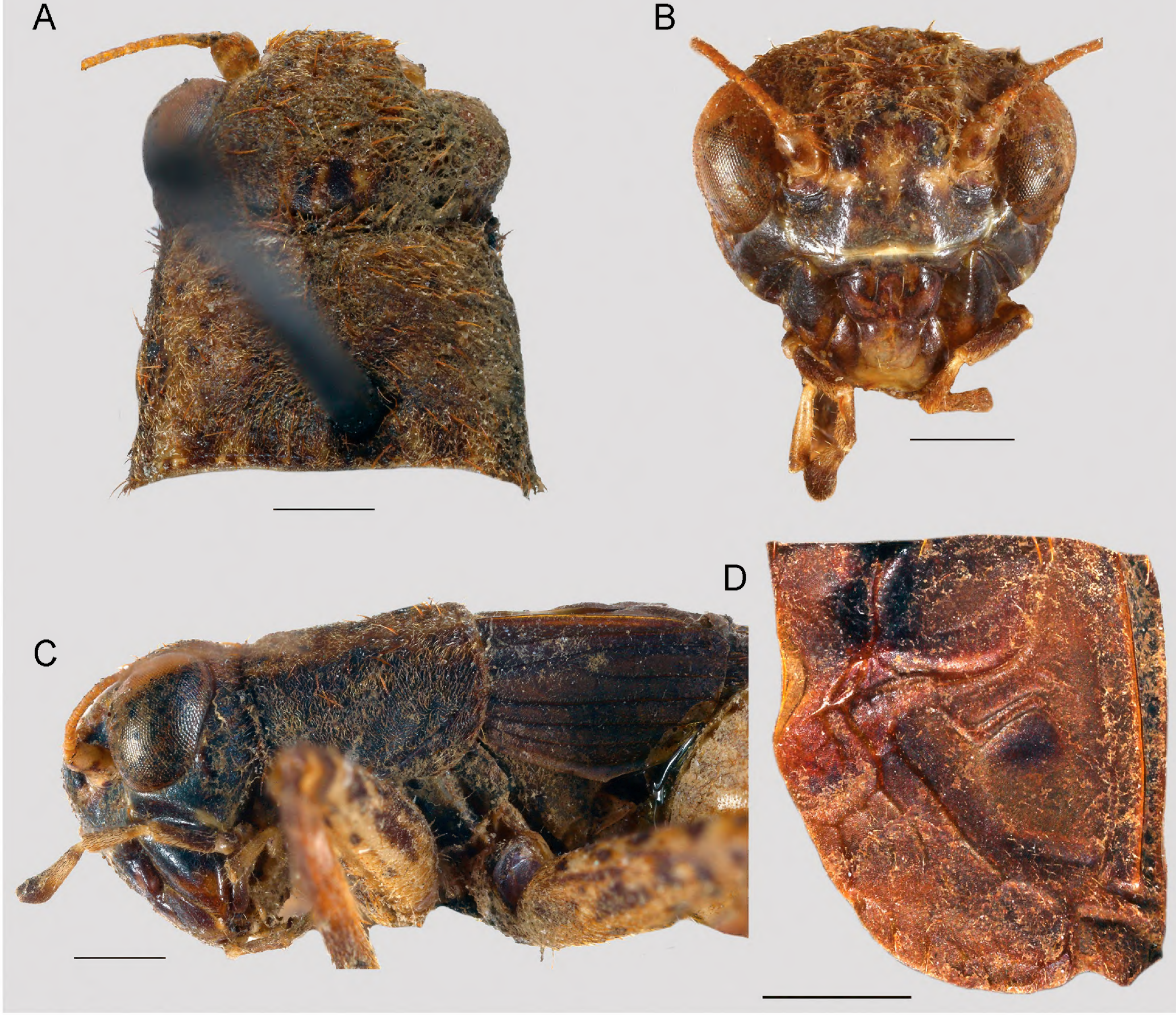

Fig. 12. *Gnominthus hihilai* Robillard & Tan, **sp. nov.** male. **A.** Head and pronotum in dorsal view; **B.** Face in anterior view; **C.** Anterior part of body in lateral view; **D.** FW in dorsal view. Scale bars: 1 mm.

understand the evolution of the acoustic communication and the phylogenetic relationships among these crickets.

Despite these efforts, large areas of knowledge remain to be explored. The calling songs of many species and genera from Lebinthina are still unknown. These include, but not exclusively, recently erected *Rugabinthus*, as well as *Lutinthus* **gen. nov.** and numerous new species described from old museum specimens. To collect such bioacoustics data would require further fieldwork in this part of the world to find these crickets and record their calling songs. As technological advances for sequencing mitochondrial genomes and nuclear genes from old type specimens have been made (Dong et al. 2024), a more comprehensive phylogeny (c.f. Tan et al. 2021) may soon be available to include all genera and species in phylogenetic studies, including type specimens (He al. 2024). However, this remains a massive undertaking. Finally, there are certainly more species and even new genera of Lebinthina to be discovered and described, not just from New Guinea but across the distribution of this fascinating and speciose subtribe of eneopterine crickets.

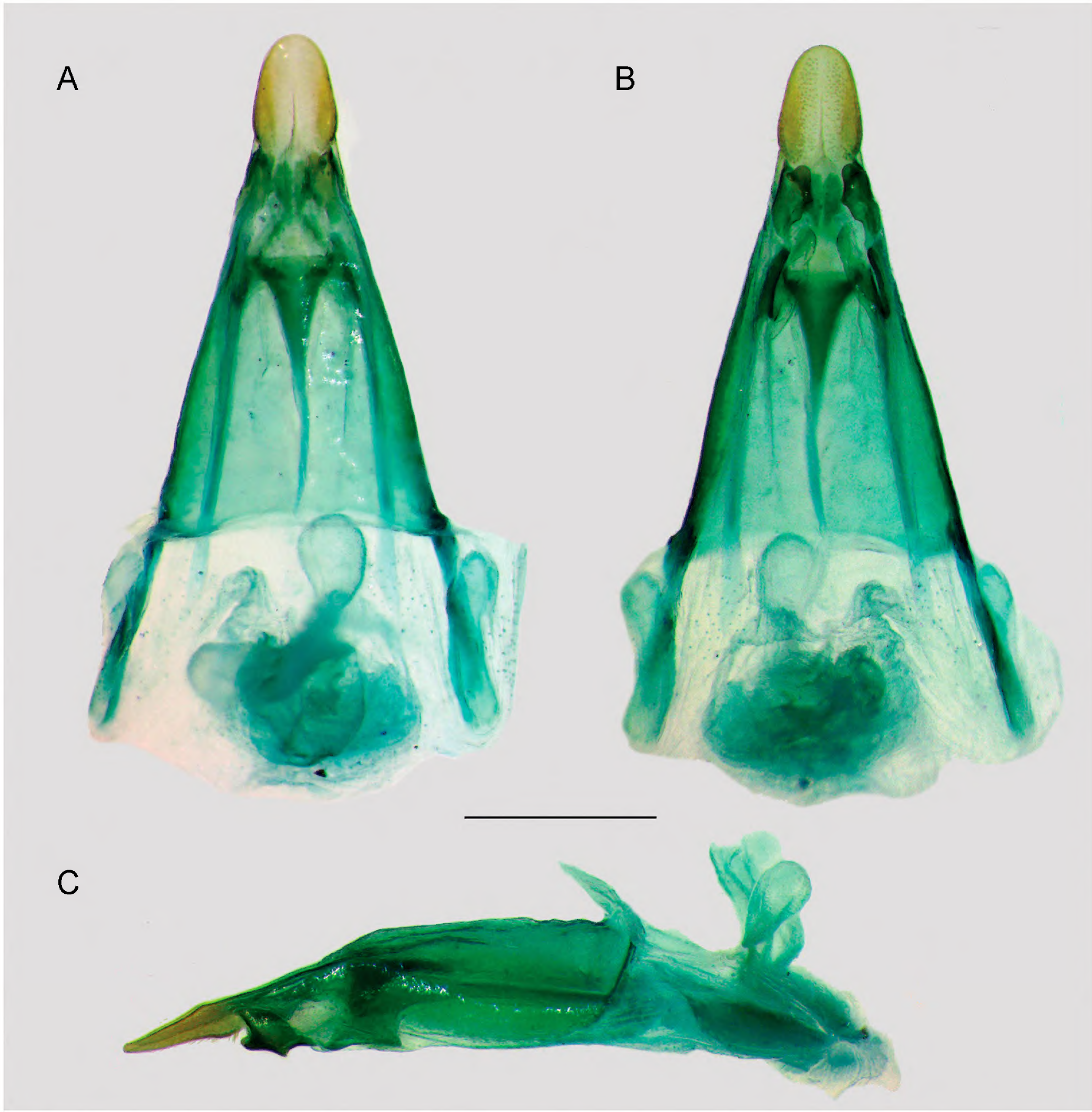

Fig. 13. *Gnominthus hihilai* Robillard & Tan, **sp. nov.** male genitalia. **A.** Dorsal view; **B.** Ventral view; **C.** Lateral view. Scale bars: 0.5 mm.

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